



# MATERIAL SAFETY DATA SHEET

(According to GHS rev. 5)

## CICLOHEXANO

### 1.IDENTIFICATION

<b>Company:</b> YPF S.A. <b>Address:</b> Av. Macacha Güemes n° 515 CP C1106BKK <b>Buenos Aires - ARGENTINA</b> <b>Tel# (+ 5411) 5441-2000</b> <b>Fax# (+ 5411) 5441-5796</b>	<b>Commercial name:</b> CYCLOHEXANE <b>Chemical name:</b> Cyclohexane.
	<b>Synonyms:</b> Hexamethylene. Hexahydrobenzene.
	<b>Emergency Telephone:</b> <b>Argentina: 0800-222-2933</b> <b>Other countries: (+5411) 4611 2007</b>

### 2.HAZARD IDENTIFICATION

#### 2.1 LABEL ELEMENTS

<b>Pictograms</b>			
<b>Warning word</b>	Peligro		
<b>Hazard statement</b>	Highly flammable liquid and vapour. May be fatal if swallowed and enters airways.	Causes skin irritation. May cause drowsiness or dizziness.	Very toxic to aquatic life with long lasting effects.
<b>Classification criteria</b>	Flammable liquid (Category 2) Aspiration hazard (Category 1)	Skin corrosion/irritation (Category 2) Specific target organ toxicity – single exposure (Category 3)	Short-term (acute) aquatic hazard (Category 1) Long-term (chronic) aquatic hazard (Category 1)
<b>Other regulations</b>	-		
<b>OTHER HAZARDS</b>			
-			

### 3.COMPOSITION/INFORMATION ON INGREDIENTS

**General composition:** Cyclohexane.

Main components	Range %	Classification	S Phrases
Cyclohexane CAS # 110-82-7	100		S(2)-9-16-25-33-60-61-62

#### 4. FIRST-AID MEASURES

**Inhalation:**

For those providing assistance, avoid exposure. Use proper protection if necessary. Move victim and get fresh air. Keep calm. If not breathing, give artificial respiration. If having difficulty breathing, give oxygen. Get medical advice.

**Ingestion/Aspiration:**

DO NOT INDUCE VOMITING. Give water to drink. Never give anything by mouth to an unconscious person. Get medical advice. If vomiting occurs spontaneously, place victim on side to reduce the risk of aspiration.

**Contact skin/eyes:**

Skin contact: Wash immediately after contact with soap and water for at least 20 minutes. Remove contaminated clothing and wash before reuse.  
Eye contact: Immediately flush with water for at least 20 minutes, holding eyelids apart to ensure that all eye and lid tissues rinsed. Washing eyes within several seconds is essential to achieve maximum effectiveness. If you have contact lenses, remove them after the first 5 minutes, then continue rinsing eye. Get medical advice.

**General measures:**

Avoid exposure to the product, taking appropriate protective measures. Medical advice: Symptomatic treatment.

#### 5. FIRE-FIGHTING MEASURES

**Extinguishing agents:**

Dry chemical, foam, CO<sub>2</sub>, water fog or water spray. Do not use water jets.

**Non suitable extinguishing agents:** WATER SHOULD NEVER BE USED DIRECTLY.

**Combustion products:** CO<sub>2</sub>, H<sub>2</sub>O and CO and toxic/irritant vapours in case of incomplete combustion.

**Special measures:**

Evacuate the area. If a leak or spill has not ignited, use water spray to disperse vapours and protect personnel attempting to stop leak. Move containers from fire area if you can do it without risk. Do not put water inside containers or areas of leakage. Spray containers with water to keep them cool. Cool containers with flooding quantities of water until well after the fire is out. Fight fire from maximum distance or use unmanned hose holders or monitor. Withdraw immediately in case of rising sound from venting safety vents, or if the tank begins to discolor. ALWAYS stay away from tanks engulfed in fire.

**Special hazards:**

It can produce toxic fumes of carbon monoxide, aldehydes and products of incomplete combustion in case of fire.

**Protective equipment:**

Use self-contained breathing apparatus. Structural protective clothing provides limited protection in fire in fire situations ONLY; It may not be effective in spill situations. For large spills wear protective clothing against chemicals, which is specifically recommended by the manufacturer. It may provide little or no thermal protection.

## 6. ACCIDENTAL RELEASE MEASURES

### Environmental precautions:

Contain liquid with a dike. Prevent entry into waterways, sewers, basements or confined areas.

### Personal precautions:

Avoid sources of ignition. Evacuate personnel to a ventilated area. Use SCBA and skin and eye protection. Wear impervious gloves. Ventilate immediately, especially in low areas where vapours may accumulate.

### Cleanup methods:

Collect the product through sand, earth or inert absorbent material and completely clean or wash the contaminated area.  
Provide water and waste collected in marked for disposal as chemical waste containers.

### Personal protection:

We recommend the use of breathing apparatus and impervious suits and gloves or other suitable protective clothing and goggles.

## 7. HANDLING AND STORAGE

### Handling:

#### *General precautions:*

Do not eat, drink or smoke during handling. Avoid contact with eyes, skin and clothing. Wash arms, hands, and nails after handling. Use of gloves is recommended. Avoid inhalation of vapours. Keep container closed. Use with adequate ventilation. Handle containers with care. Open slowly in order to control possible pressure. Static discharges can ignite the product. Ensure discharge grounded before handling. Prevent small spills and leakage to avoid slip hazard. Keep the product in properly sealed and labelled containers in cool and well-ventilated place. Keep them away from heat and sources of ignition. Do not smoke, weld or do any work that can produce flames or sparks in storage area.

*Specific conditions:* Good antisparkling ventilation system. Special procedures during bulk loading, cleaning and maintaining the tanks to avoid vapour exposure. Make sure that tanks have been thoroughly purged before performing any cleaning or maintaining procedure

*Specific Use:* Solvent.

### Storage:

#### *Temperature and decomposition products:*

Storage, use or heating does not produce dangerous products. In case of fire, see Section V.

#### *Dangerous reactions:*

Static electricity may ignite the product. Provide ground connection.

#### *Storage conditions:*

Store in a clean, dry, well-ventilated area. Protect from sun light. Storage far away ignition sources.

*Incompatible materials:* Strong oxidants, N<sub>2</sub>O<sub>4</sub>.

## 8.EXPOSURE CONTROLS/PERSONAL PROTECTION

### *Eye protection:*

### **Personal protection:**

Should wear safety glasses, chemical splash-proof (complying with EN 166).

### *Respiratory protection:*

Where necessary, use a organic vapour (A or AX) respirator. Special attention to oxygen levels in the air should be paid. If large releases occur, wear self-contained breathing apparatus (SCBA).

### *Skin protection:*

When handling this product should wear impermeable protective PVC, nitrile or butyle gloves (complying with standards EN 374), clothes and safety footwear resistant to chemicals. *Other protective equipment:* Showers and eye-washers in working area.

### **General precautions:**

Keep workplace ventilated. The normal routine ventilation is usually adequate. Local hoods should be used for operations that produce or release large amounts of product. In low or confined areas should be provided mechanical ventilation.

### **Specific hygiene measures:**

Good work practices and the adoption of hygienic measures reduce unnecessary exposures. Showers should be available with hot soapy water (non-solvent). Using skin creams after work is recommended.

### **Exposure controls:**

TLV-TWA (ACGIH): 100 ppm (350 mg/m<sup>3</sup>)

TLV-STEL (ACGIH): S/D

PEL (OSHA 29 CFR 1910.1000): 300 ppm (1050 mg/m<sup>3</sup>)

IDLH (NIOSH): 1300 ppm (4500 mg/m<sup>3</sup>)

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance:</b> Liquid.	<b>pH:</b> Do not apply.
<b>Colour:</b> Colourless.	<b>Odour:</b> Pungent.
<b>Boiling point:</b> 80.7 (177.3 °F)	<b>Melting/Freezing point:</b> 6.5 °C (43.7°F)
<b>Flash point:</b> -18°C (-0.4°F) c.c.	<b>Autoignition temperature:</b> 473°C (245°F)
<b>Explosive properties:</b> Lower Explosive Limit: 1.3 % Upper Explosive Limit: 8.3 %	<b>Oxidizing properties:</b> NP
<b>Vapour pressure:</b> 96,9 mmHg (13kPa) at 25°C	<b>Density:</b> 0.78 g/cc at 20°C
<b>Surface tension:</b> No data available.	<b>Viscosity:</b> (at 20 °C) 1.26 cSt
<b>Vapour density:</b> 2.98 (Air: 1)	<b>Partition coefficient (n-octanol/water):</b> 3.44
<b>Water solubility:</b> Insoluble.	<b>Solubility:</b> Acetone, alcohol and benzene.
<b>Other data:</b> Molecular weight: 84.16 g/mol Evaporation index: 2.6 (Ether = 1)	

## 10. STABILITY AND REACTIVITY

<b>Stability:</b> Material is stable under normal conditions.	<b>Conditions to avoid:</b> Static electricity may ignite the product. Provide ground connection.
<b>Materials to avoid:</b> Strong oxidants, N <sub>2</sub> O <sub>4</sub> .	
<b>Hazardous decomposition/combustion products:</b> Storage, use or heating does not produce dangerous products. In case of fire, see Section V.	
<b>Polymerizations risk:</b> Material is not expected to produce dangerous polimerization.	<b>Conditions to avoid:</b> No data available.

## 11. TOXICOLOGICAL INFORMATION

### Routes of exposure:

Dermal, ocular or inhalation.

### Acute and chronic effects:

Eye contact: may cause redness and irritation.

Skin contact: may cause skin irritation. May cause dermatitis in prolonged or repeated exposures.

Inhalation: may cause headache, nausea, nose and through irritation, somnolence, unconsciousness, and in extreme cases, death.

Swallowing: may cause gastrointestinal discomfort.

### Animal data:

LD50 oral (rat, OECD 401): > 5000 mg/kg

LD50 der (rabbit, OECD 402): > 2000 mg/kg

LC50 inh. (rat, 4hs., OECD 403): > 5540 ppm

Skin irritation (rabbit, OECD 404): not irritant.

Eye irritation (rabbit, OECD 405): slightly irritant.

Skin sensitization (Guinea pig, OECD 406): not sensitizing

Resp. sensitization (human, -): S/D

### Carcinogenicity:

No component of this product is identified that present levels greater than or equal to 0.1% as probable, possible or confirmed by the IARC (International Agency for Research on Carcinogens) as a human carcinogen.

**Reproductive toxicity:** No data available.

**Medical conditions wich increase hazard to exposure:** Respiratory deficiencies and dermatological problems. It may aggravate existing liver or kidney disease.

## 12. ECOLOGICAL INFORMATION

### Pollutant potential:

#### *Persistence and degradability:*

BIODEGRADABILITY (OECD 301 F): 77% in 28d. - readily biodegradable.

PNEC (water): 0,207 mg/l (F=1)

PNEC (sea water): 0,207 mg/l (F=1)

PNEC-STP: 3,24 mg/l (F=1)

#### *Mobility/bioaccumulative potential:*

Log Ko/w: 3,44

FISH BIOACCUMULATION FACTOR – BCF (OCDE 305): 31 - 102

This mixture does not contain PBT components.

LogKoc: 2,89

HENRY'S CONSTANT: 0,15 Pa.m<sup>3</sup>/mol a 20°C

Distribution (%): AIR: - - WATER: - - SOIL: - - SEDIMENT: - - BIOTA: -.

### Ecotoxicological effects:

LC50 (Pimephales promelas, OECD 203, 96hs.): 4,53 mg/l

EC50 (Daphnia magna, OECD 202, 48hs.): 0,9 mg/l

EC50 (Pseudokirchnerella subcapitata, OECD 201, 72hs.): 3,4 mg/l

LC50 (activated sludge, OECD 209, 15 hs.): 29 mg/l

LC50 (Oncorhynchus sp., OECD 204, 40d.): S/D

LC50 (Daphnia magna, OECD 211, 21d.): S/D

### 13. DISPOSAL CONSIDERATIONS

**Disposal methods (surplus):** Incineration or recycling when possible.

**Waste:** Liquids and solid from industrial processes or other uses.

*Disposal:* Consult with authorized environmental regulatory agencies for guidance on acceptable disposal practices.

*Handling:*

Contaminated materials with product are dangerous and need the same precautions as the product and should be considered a toxic and hazardous waste. Never move the product to drain or sewer.

*Provisions:*

Both the excess product and empty containers should be disposed of in accordance with current legislation on Environmental Protection and in particular Hazardous Waste Laws. Empty containers may contain residue and therefore be dangerous. Do not attempt to refill or clean containers without proper instructions possess. Empty drums should be purged, completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be recycled, recovered or disposed of through suitably qualified or licensed and in compliance with official regulations contractors. NO PRESSURISE, CUT, WELD WITH HARD OR SOFT METALS WELDING OR STRONG OR DRILL, GRIND OR EXPOSE THOSE CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

### 14. TRANSPORT INFORMATION

**Special precautions:**

Transported in properly closed and labeled containers.

**Additional Information:**

**LAND TRANSPORT:**

Proper shipping name :	CYCLOHEXANE.
UN Number :	1145
Hazard class :	3
Hazard identification number :	33
Packing group :	II
Exempt amount :	1L / E2

**AIR TRANSPORT (ICAO/IATA) :**

Proper shipping name :	CYCLOHEXANE.
UN Number :	1145
Hazard class :	3
Packing group :	II
CRE :	3H
Passenger and cargo aircraft :	Y341, 1L / 353, 5L
Cargo aircraft only :	364, 60L

**MARITIME TRANSPORT (IMDG/IMO) :**

Proper shipping name :	CYCLOHEXANE.
UN Number :	1145
Hazard class :	3
Packing group :	II
Marine pollutant :	YES
Stowage and segregation :	Category E
Ems :	F - E ; S - D

## 15.REGULATORY INFORMATION

**CLASIFICACION:** LABELLING

**Symbols:**

**F - X - N**

**Phrases R:**

R11 - Highly flammable.

R38 - Irritating to skin.

R65 - Harmful: may cause lung damage if swallowed.

R67 - Vapours may cause drowsiness and dizziness.

R50/53 - Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Phrases S:**

S 2 - Keep out of the reach of children.

S 63 - In case of accident by inhalation: remove casualty to fresh air and keep at rest.

S 16 - Keep away from sources of ignition – No smoking.

S 25 - Avoid contact with eyes.

S 33 - Take precautionary measures against static discharges.

S 51 - Use only in well-ventilated areas.

S 61 - Avoid release to the environment. Refer to special instructions/safety data sheet.

**Other regulations:** Cyclohexane is listed in TSCA Inventory (EPA).



## 16. OTHER INFORMATION

### Data Bases consulted

EINECS: European Inventory of Existing Commercial Substances.  
TSCA: Toxic Substances Control Act, US Environmental Protection Agency  
HSDB: US National Library of Medicine.  
RTECS: US Dept. of Health & Human Services

### R phrases show in the document:

### Legislation consulted:

Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).  
Dir. 67/548/EEC about classification, labelling and packaging of dangerous substances (including amendments and adaptations in force).  
Dir. 1999/45/EC about classification, labelling and packaging of dangerous preparations (including amendments and adaptations in force).  
Dir. 91/689/EEC dangerous waste; Dir. 91/156/EEC waste management.  
Royal Decree 363/95: Regulation about notification of new substances and classification, packaging and labelling of dangerous substances.  
Royal Decree 255/2003: Regulation about classification, packaging and labelling of dangerous preparations.  
European Agreement concerning the international carriage of dangerous goods by road (ADR).  
Regulation on the international transport of dangerous goods on the railway. (RID)  
International maritime code of dangerous goods. (IMDG)  
International Air Transport Association (IATA) regulation pertaining to air shipment.

### Glossary:

CAS: Chemical Abstract Service

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists.

TLV: Threshold Limit Value

TWA: Time Weighted Average

STEL: Short-term Exposure Level

REL: Recommendable Exposure Limit

PEL: Permissible Exposure Limit

INSHT: Instituto Nal. de Seguridad e Higiene en el Trabajo

VLA-ED: Valor Límite Ambiental – Exposición Diaria

VLA-EC: Valor Límite Ambiental – Exposición Corta

LD<sub>50</sub>: Lethal Dose Medium

LC<sub>50</sub>: Lethal Concentration Medium

EC<sub>50</sub>: Effective Concentration Medium

IC<sub>50</sub>: Inhibitory Concentration Medium

BOD: Biological Oxygen Demand.

NP: Not Pertinent

| : Changes from the last revision

[1407.057]

The information given in this document has been compiled based on the best existing information sources, latest available knowledge and according to the current requirements on classification, packaging and labelling of hazardous substances. It does not imply the information is exhaustive or accurate in all cases. It is the user's responsibility to determine the validity of the information contained in this Material Safety Data Sheet to apply depending on the case.